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MARTA E. DELSIGNORE, PH.D.
PITNEY, HARDIN, KIPP & SZUCH LLP
711 THIRD AVENUE
NEW YORK, NY 10017-4014

EXAMINER

YAMNITZKY, MARIE ROSE

ART UNIT PAPER NUMBER

1774

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/857,300

Applicant(s)

KATHIRGAMANATHAN,
POOPATHY

Examiner

Marie R. Yamnitzky

Art Unit

1774

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 01 June 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 22-36 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 22-36 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 4.6 6) ☐ Other:

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1. The numbering of the original claims is not in accordance with 37 CFR 1.126 because the claims are not numbered consecutively. Instead, the original claims are numbered 1-7 and 9-22. Misnumbered claims 9-22 have been renumbered 8-21.

The misnumbering of the original claims leads to a misnumbering of new claims as presented in the preliminary amendment filed 06/01/01. The preliminary amendment requests cancellation of claims 1-22 and entry of new claims 23-37.

Claim 1-21 have been cancelled. Misnumbered claims 23-37 have been renumbered 22-36 and have been entered. The claim dependency of the new claims has been corrected to reflect the renumbering of the claims. (For example, the second new claim had been numbered as "24" and depended from "23". The second new claim has been renumbered as --23-- and now depends from --22--.)

Claims 22-36 are pending.

2. Claims 22-36 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 22, with claims 23-35 dependent directly or indirectly therefrom: Proper antecedent basis is lacking for "the anode" as recited in line 2 of claim 22 and "the cathode" as recited in line 3 of claim 22. The examiner suggests changing "the anode" to --an anode-- and changing "the cathode" to a --cathode--.

Claims 24 and 28: It is not clear if the hole transporting material must comprise all three recited materials, or at least one of the three, or only one of the three.

Claims 24 and 28: In the second chemical name, "I,I" should be --1,1'--.

Claim 31, with claim 33 dependent therefrom: There is no antecedent basis for "the mixed lithium quinolate/hole transporting material layer" as dependent from claim 25 (claim 25 only requires mixing of lithium quinolate and a polyolefin). The examiner suggests amending claim 31 to depend from claim 27.

Claims 33 and 34: The scope of a "different metal quinolate" is not clear. It is not clear if this requires a metal quinolate other than lithium quinolate or, in view of the paragraph bridging pages 2 and 3 of the specification, if the different metal quinolate may be a lithium quinolate having a quinolinol ligand that is different than the quinolinol ligand of the lithium quinolate required by claim 22.

Claim 36: Proper antecedent basis is lacking for "the anode" as recited in line 2 of claim 36 and "the lithium quinolate layer" as recited in line 3 of claim 36. The examiner suggests changing "the anode" to --an anode-- and "the lithium" to --a lithium--. Claim 36 is also confusing in requiring a substrate formed of a transparent conductive material as an anode and also requiring a "metal anode". Since claim 36 requires the "metal anode" to be connected to an electron transporting layer, and since no cathode is explicitly recited, it appears that "metal anode" in line 4 should read --metal cathode--.

3. Regarding claim interpretation:

In view of some of the dependent claims which require a layer between the cathode and the lithium quinolate layer, the examiner interprets claim 22's requirement for a metal contact "connected to" the lithium quinolate layer as a requirement for an electrical connection rather than a requirement for direct physical contact.

Subject to clarification, the examiner interprets claims 24 and 28 as requiring at least one of the three recited materials. This interpretation is consistent with the device example set forth in the specification.

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 22-25 are rejected under 35 U.S.C. 102(b) as being anticipated by VanSlyke et al. (US 4,720,432).

See the whole patent. In particular, see column 4, lines 36-56, c. 5, l. 34-50, c. 7, l. 49-c. 9, l. 36, c. 11, l. 6-c. 12, l. 10 (especially c. 12, l. 3), c. 12, l. 50-68 and c. 14, l. 7-10.

Although VanSlyke et al. give no specific working example of a device comprising a lithium quinolate layer, it is the examiner's position that one of ordinary skill in the art could at once envisage devices meeting the limitations of present claims 22-25 based on VanSlyke's

disclosure as a whole and especially based on VanSlyke's disclosure of "Lithium oxine (a.k.a., 8-quinolinol lithium)" as a useful chelated oxinoid compound for use in the organic electron injecting and transporting zone of VanSlyke's electroluminescent device.

6. Claims 22-24, 29, 30 and 36 are rejected under 35 U.S.C. 102(b) as being anticipated by JP 6-145146.

(JP 6-145146 was cited by applicant in the IDS filed 12/31/01. An English language abstract was provided by applicant. A machine-assisted translation of the document is provided with this Office action. Because the translation is machine-assisted, it is a very rough translation.)

JP 6-145146 discloses various metal quinolates for use in an electroluminescent device. The metal of the metal quinolates may be lithium. For example, see paragraphs [0004]-[0005] and [0030].

The metal quinolates can be used in the luminous layer of the device, sandwiched between an anode and a metal cathode. The metal quinolates are also disclosed as having good electron transport properties. The device may further comprise a hole injecting layer between the anode and the luminous layer and/or may further comprise an electron injecting layer between the cathode and the luminous layer. Various known hole transporting materials are disclosed for use in the hole injecting layer and various known electron transporting materials are disclosed for use in the electron injecting layer. TPD is specifically disclosed for use in the hole injecting layer. For example, see paragraphs [0007] and [0010]-[0019].

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Although JP 6-145146 gives no specific working example of a device comprising a lithium quinolate layer, it is the examiner's position that one of ordinary skill in the art could at once envisage devices meeting the limitations of present claims 22-24, 29, 30 and 36 based on the prior art disclosure as a whole and especially based on the prior art disclosure that M in the formulae shown in paragraphs [0004]-[0005] may be lithium.

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 29, 30, 32 and 34-36 are rejected under 35 U.S.C. 103(a) as being unpatentable over VanSlyke et al. (US 4,720,432) as applied to claims 22-25 above, and for the further reasons set forth below.

VanSlyke et al. teach that there must be at least one layer forming the electron injecting and transporting zone and teach that metal chelated oxinoid compounds such as chelates of oxine may be used to form the electron injecting and transporting layers of the device (emphasis added).

With respect to present claims 29, 30 and 36, based on VanSlyke's teachings, one of ordinary skill in the art at the time of the invention would have readily recognized that there may be two or more layers forming the electron injecting and transporting zone of VanSlyke's device.

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It would have been a *prima facie* obvious modification to one of ordinary skill in the art at the time of the invention to include a layer of an electron injecting material between a cathode and a layer of lithium oxine in a device according to VanSlyke in order to make a device having a multi-layered electron injecting and transporting zone as suggested by VanSlyke.

With respect to present claims 32, 34 and 35, VanSlyke et al. do not explicitly disclose using a mixture of materials in a single layer of the electron injecting and transporting zone, but it would have been a *prima facie* obvious modification to one of ordinary skill in the art at the time of the invention to utilize two materials in combination that are taught to be useful for the same purpose. Since VanSlyke et al. disclose various metal chelated oxinoid compounds as being useful for forming the electron injecting and transporting layers of the device, one of ordinary skill in the art at the time of the invention would have reasonably expected that mixtures of different metal chelated oxinoid compounds could be used for forming a layer of the electron injecting and transporting zone.

Further with respect to present claim 35, "Aluminum trisoxine (a.k.a., tris(8-quinolinol)aluminum)" is one of the chelated oxinoid compounds disclosed for use in the electron injecting and transporting zone of VanSlyke's electroluminescent device. Given VanSlyke's disclosure of aluminum trisoxine and lithium oxine as being suitable for the same purpose, one of ordinary skill in the art at the time of the invention would have reasonably expected that a mixture of aluminum trisoxine and lithium oxine would be suitable for formation of a layer of the electron injecting and transporting zone of VanSlyke's device.

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9. Claims 22-36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mori et al. (US 5,281,489) in view of VanSlyke et al. (US 4,720,432) or JP 6-145146.

See the whole patent. In particular, see column 3, lines 22-47, c. 4, l. 20-c. 8, l. 30, c. 23, l. 37-c. 25, l. 23, c. 26, l. 63-c. 27, l. 38 and c. 28, l. 47-c. 29, l. 49.

Mori et al. disclose an electroluminescent (EL) device comprising an organic luminescent layer disposed between an anode and a cathode. The device may further comprise a hole injecting/transporting layer disposed between the anode and the luminescent layer and/or may further comprise a hole inhibiting layer (made of an electron moving/donating agent) disposed between the cathode and the luminescent layer. The luminescent layer comprises a mixture of at least one fluorescent luminescent agent, at least one hole moving/donating agent, and at least one electron moving/donating agent.

Mori et al. disclose that metal complexes of 8-hydroxyquinolines may be used as the electron moving/donating agent (c. 8, l. 29-30 and c. 29, l. 25) and that metal complexes may be used as the fluorescent luminescent agent (c. 24, l. 65-68). In Mori's Example 63, tris(8-quinolinol) aluminum is used in the hole inhibiting layer.

Mori et al. disclose TPD and poly(vinylcarbazole) for use as the hole moving/ donating agent (c. 4, l. 44-46 and c. 6, l. 56-57).

Mori et al. disclose polyolefins such as polystyrene for use as a binder (c. 27, l. 22 and c. 29, l. 38-39).

While Mori et al. disclose that metal complexes of 8-hydroxyquinolines may be used as the electron moving/donating agent and may be used as the fluorescent luminescent agent, Mori et al. do not specifically disclose the use of lithium complexes of 8-hydroxyquinolines.

Lithium complexes of 8-hydroxyquinolines were known in the art at the time of the invention as being suitable for use as a luminescent material in an EL device and as being suitable for use as an electron transporting/injecting material in an EL device.

VanSlyke et al. disclose lithium oxine for use in the organic electron injecting and transporting zone of an EL device. See the whole VanSlyke patent. In particular, see column 4, lines 36-56, c. 5, l. 34-50, c. 7, l. 49-c. 9, l. 36, c. 11, l. 6-c. 12, l. 10 (especially c. 12, l. 3), c. 12, l. 50-68 and c. 14, l. 7-10.

JP 6-145146 discloses various metal quinolates for use in an EL device. The metal of the metal quinolates may be lithium. For example, see paragraphs [0004]-[0005] and [0030]. The metal quinolates can be used in the luminous layer of the device, sandwiched between an anode and a metal cathode. The metal quinolates are also disclosed as having good electron transport properties.

It would have been *prima facie* obvious to one of ordinary skill in the art at the time of the invention, having knowledge of the disclosure of VanSlyke et al. or JP 6-145146, to utilize a lithium complex of 8-hydroxyquinoline as an electron moving/donating agent or as a fluorescent luminescent agent in a device according to Mori et al. because the teachings of VanSlyke et al. or JP 6-145146 demonstrate that lithium complexes of 8-hydroxyquinolines are known materials, and were known in the art at the time of the invention to be suitable for Mori's purposes.

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Guided by the teachings of Mori et al., it would have been within the level of ordinary skill of a worker in the art at the time of the invention, as a matter of routine experimentation, to determine suitable and optimum combinations of materials for the different layers of an EL device comprising a lithium complex of 8-hydroxyquinoline as an electron moving/donating agent or as a fluorescent luminescent agent.

10. Miscellaneous:

Claim 32 is lacking a period at the end of the claim.

11. Any inquiry concerning this communication should be directed to Marie R. Yamnitzky at telephone number (703) 308-4413. The examiner works a flexible schedule but can generally be reached at this number from 6:30 a.m. to 4:00 p.m. Monday, Tuesday, Thursday and Friday, and every other Wednesday from 6:30 a.m. to 3:00 p.m.

The current fax numbers for Art Unit 1774 are (703) 872-9311 for official after final faxes and (703) 872-9310 or (703) 305-5408 for all other official faxes. (Unofficial faxes to be sent directly to examiner Yamnitzky can be sent to (703) 872-9041.)

MRY
02/21/03

Marie R. Yamnitzky
MARIE YAMNITZKY
PRIMARY EXAMINER
1774